

CLAIMS

1. (Amended) A method for removing solvent from polymer solution by putting the polymer solution in contact with steam to remove the solvent by steam stripping, comprising:

a step of feeding a part of said steam into a tube for transferring said polymer solution to a tank for removing solvent;

a step of feeding the remaining part of said steam into the inside of said tank for removing solvent; and

the whole amount of said steam is large as 100 parts by mass or more per 100 parts by mass of the solvent contained in said polymer solution and a part of said steam is 10 to 50 % by mass when the whole amount of said steam is defined as 100 % by mass.

2. A method for removing solvent from polymer solution according to Claim 1, wherein a gas-liquid mixer is arranged in said tube and a part of said steam is fed into said gas-liquid mixer.

3. (Cancelled)

4. (Cancelled)

5. (Cancelled)

6. (Cancelled)

7. (Cancelled)

8. (Cancelled)

9. (Amended) A method for removing solvent from polymer solution by putting the polymer solution in contact with steam to remove the solvent by steam stripping, comprising:

a step of feeding a part of said steam into a tube for transferring said polymer solution to a tank for removing solvent;

a step of feeding the remaining part of said steam into the inside of said tank for removing solvent; and

said tank for removing solvent is equipped with at least one selected from the following members (1), (2) and (3):

(1) a partition member arranged beneath the position where a flush nozzle arranged in communication with said tube for transferring polymer solution is opened, so that the gas phase part of said tank for removing solvent may be partitioned into an upper part and a lower part, to suppress the flow of the solvent vapor discharged from said flush nozzle down to the side of the liquid phase;

(2) a sprinkler arranged inside said tank for removing solvent to sprinkle warm water so as to suppress polymer adhesion or

make deposited polymer flow down to the liquid phase part;

(3) a flush nozzle structure selected from the following members (a)-(e) to reduce the flush speed of the polymer solution discharged from a flush nozzle arranged in communication with said tube for transferring polymer solution and to suppress the flow of the solvent vapor down to the side of the liquid phase.

(a) a flush nozzle structure is a flush nozzle with a branch tube arranged on the side of the tip end thereof;

(b) a flush nozzle structure is equipped at least with a cylinder opened toward the downward portion of said tank for removing solvent and a flush nozzle arranged in communication with said tube for transferring polymer solution, and opened toward the diameter direction of said cylinder in the vicinity of the inner wall face of said cylinder;

(c) a flush nozzle structure is a spiral tube arranged in communication with said tube for transferring polymer solution and formed in a spiral shape along the vertical direction of said tank for removing solvent, where an opening is arranged toward the downwardness of said tank for removing solvent;

(d) a flush nozzle structure is equipped a flush nozzle arranged large-diameter tube on the tip end of said flush nozzle and baffle arranged in the inside of said large-diameter tube;

(e) a flush nozzle structure is a flush nozzle is equipped a curved tube with a curved tube part which is arranged on the

tip end of the flush nozzle.

10. (Amended) A method for removing solvent from polymer solution according to Claim 9, wherein a gas-liquid mixer is arranged in said tube and a part of said steam is fed into said gas-liquid mixer.

11. (Cancelled)

12. (Cancelled)

13. (Amended) An apparatus for removing solvent, including a tank for removing solvent, comprising:

 a tube for transferring polymer solution to transfer polymer solution to the tank for removing solvent, one end of which is opened in the tank for removing solvent,

 a steam feed tube for piping which is in communication with said tube for transferring polymer solution to feed steam to the said tube, and a steam feed tube for tank, one end of which is opened in said tank for removing solvent,

 said apparatus is equipped with a partition member arranged beneath the position where a flush nozzle arranged in communication with said tube for transferring polymer solution is opened, so that the gas phase part of said tank for removing solvent may be partitioned into an upper part and a lower part,

to suppress the flow of the solvent vapor discharged from said flush nozzle down to the side of the liquid phase.

14. An apparatus for removing solvent according to Claim 13, wherein said partition member has a corn-type shape slanting downward from the side of the inner wall of said tank for removing solvent toward the side of the center thereof and has an opening only on the center part thereof.

15. (Amended) An apparatus for removing solvent according to Claim 13, wherein said apparatus is equipped with a gas-liquid mixer arranged in said tube for transferring polymer solution, and a steam feed tube for the gas-liquid mixer which is in communication with said tube for transferring polymer solution or said gas-liquid mixer to feed steam into said gas-liquid mixer.

16. An apparatus for removing solvent according to Claim 15, wherein said partition member has a corn-type shape slanting downward from the side of the inner wall of said tank for removing solvent toward the side of the center thereof and has an opening only on the center part thereof.

17. (Amended) An apparatus for removing solvent, including a tank for removing solvent, comprising:

a tube for transferring polymer solution to transfer polymer solution to the tank for removing solvent, one end of which is opened in the tank for removing solvent,

a steam feed tube for piping which is in communication with said tube for transferring polymer solution to feed steam to the said tube, and a steam feed tube for tank, one end of which is opened in said tank for removing solvent,

said apparatus is equipped with a sprinkler arranged inside said tank for removing solvent to sprinkle warm water so as to suppress crumb adhesion or make deposited crumb flow down to the liquid phase part.

18. (Amended) An apparatus for removing solvent according to Claim 17, wherein said apparatus is equipped with a gas-liquid mixer arranged in said tube for transferring polymer solution, and a steam feed tube for the gas-liquid mixer which is in communication with said tube for transferring polymer solution or said gas-liquid mixer to feed steam into said gas-liquid mixer.

19. (Amended) An apparatus for removing solvent, including a tank for removing solvent, comprising:

a tube for transferring polymer solution to transfer polymer solution to the tank for removing solvent, one end of which is opened in the tank for removing solvent,

a steam feed tube for piping which is in communication with said tube for transferring polymer solution to feed steam to the said tube, and a steam feed tube for tank, one end of which is opened in said tank for removing solvent,

said apparatus is equipped with a flush nozzle structure selected from the following members (a)-(e) to reduce the flush speed of the polymer solution discharged from a flush nozzle arranged in communication with said tube for transferring polymer solution and to suppress the flow of the solvent vapor down to the side of the liquid phase.

(a) a flush nozzle structure is a flush nozzle with a branch tube arranged on the side of the tip end thereof;

(b) a flush nozzle structure is equipped at least with a cylinder opened toward the downward portion of said tank for removing solvent and a flush nozzle arranged in communication with said tube for transferring polymer solution, and opened toward the diameter direction of said cylinder in the vicinity of the inner wall face of said cylinder;

(c) a flush nozzle structure is a spiral tube arranged in communication with said tube for transferring polymer solution and formed in a spiral shape along the vertical direction of said tank for removing solvent, where an opening is arranged toward the downwardness of said tank for removing solvent;

(d) a flush nozzle structure is equipped a flush nozzle

arranged large-diameter tube on the tip end of said flush nozzle and baffle arranged in the inside of said large-diameter tube;

(e) a flush nozzle structure is a flush nozzle is equipped a curved tube with a curved tube part which is arranged on the tip end of the flush nozzle.

20. (Cancelled)

21. (Amended) An apparatus for removing solvent according to Claim 19, wherein said apparatus being equipped with a member for suppressing crumb dispersion, and the member is arranged on the tip end of the flush nozzle with a branch tube arranged on the side of the tip end thereof and is opened toward the downwardness of said tank for removing solvent.

22. and 23. (Cancelled)

24. (Amended) An apparatus for removing solvent according to Claim 19, wherein said apparatus is equipped with a gas-liquid mixer arranged in said tube for transferring polymer solution, and a steam feed tube for the gas-liquid mixer which is in communication with said tube for transferring polymer solution or said gas-liquid mixer to feed steam into said gas-liquid mixer.

25. (Cancelled)

26. (Amended) An apparatus for removing solvent according to Claim 24, wherein said apparatus is equipped with a member for suppressing crumb dispersion, where the member is arranged on the tip end of said flush nozzle with a branch tube arranged on the side of the tip end thereof and is opened toward the downward portion of said tank for removing solvent.

27. and 28. (Cancelled)

29. (Amended) An apparatus for removing solvent, including a tank for removing solvent, comprising:

 a tube for transferring polymer solution to transfer polymer solution to the tank for removing solvent, one end of which is opened in the tank for removing solvent,

 a steam feed tube for piping which is in communication with said tube for transferring polymer solution to feed steam to the said tube, and a steam feed tube for tank, one end of which is opened in said tank for removing solvent,

 a partition member arranged beneath the position where a flush nozzle arranged in communication with said tube for transferring polymer solution is opened so that the gas phase part of said tank for removing solvent may be partitioned into an upper part and a lower part, to suppress the convection current

of the solvent vapor discharged from said flush nozzle toward the side of the liquid phase; and

a sprinkler arranged inside said tank for removing solvent to sprinkle warm water so as to suppress polymer adhesion or make deposited polymer flow down to the liquid phase part.

30. (Amended) An apparatus for removing solvent according to Claim 29, wherein said apparatus is equipped with a gas-liquid mixer arranged in said tube for transferring polymer solution, and a steam feed tube for the gas-liquid mixer which is in communication with said tube for transferring polymer solution or said gas-liquid mixer to feed steam into said gas-liquid mixer.

31. (Amended) An apparatus for removing solvent according to Claim 11, wherein said apparatus is equipped with:

a sprinkler arranged inside said tank for removing solvent to sprinkle warm water so as to suppress polymer adhesion or make deposited polymer flow down to the liquid phase part; and

a flush nozzle structure selected from the following members (a)-(e) to reduce the flush speed of the polymer solution discharged from a flush nozzle arranged in communication with said tube for transferring polymer solution and to suppress the flow of the solvent vapor down to the side of the liquid phase.

(a) a flush nozzle structure is a flush nozzle with a branch

tube arranged on the side of the tip end thereof;

(b) a flush nozzle structure is equipped at least with a cylinder opened toward the downward portion of said tank for removing solvent and a flush nozzle arranged in communication with said tube for transferring polymer solution, and opened toward the diameter direction of said cylinder in the vicinity of the inner wall face of said cylinder;

(c) a flush nozzle structure is a spiral tube arranged in communication with said tube for transferring polymer solution and formed in a spiral shape along the vertical direction of said tank for removing solvent, where an opening is arranged toward the downwardness of said tank for removing solvent;

(d) a flush nozzle structure is equipped a flush nozzle arranged large-diameter tube on the tip end of said flush nozzle and baffle arranged in the inside of said large-diameter tube;

(e) a flush nozzle structure is a flush nozzle is equipped a curved tube with a curved tube part which is arranged on the tip end of the flush nozzle.

32. (Amended) An apparatus for removing solvent according to Claim 31, wherein said apparatus is equipped with a gas-liquid mixer arranged in said tube for transferring polymer solution, and a steam feed tube for the gas-liquid mixer which is in communication with said tube for transferring polymer

solution or said gas-liquid mixer to feed steam into said gas-liquid mixer.

33. (New) A method for removing solvent from polymer solution by putting the polymer solution in contact with steam to remove the solvent by steam stripping, comprising:

a step of feeding a part of said steam into a tube for transferring said polymer solution to a tank for removing solvent;

a step of feeding the remaining part of said steam into the inside of said tank for removing solvent; and

the whole amount of said steam is less than 100 parts by mass per 100 parts by mass of the solvent contained in the polymer solution and a part of said steam is 30 to 80 % by mass when the whole amount of said steam is defined as 100 % by mass.

34. (New) A method for removing solvent from polymer solution according to Claim 33, wherein a gas-liquid mixer is arranged in said tube and a part of said steam is fed into said gas-liquid mixer.